User Manual

Revision 2.000
English

Gateway M-Bus Master from/to PROFIBUS DP Slave

(New Order Code: HD67053-B2-40, HD67053-B2-80, HD67053-B2-160, HD67053-B2-250)

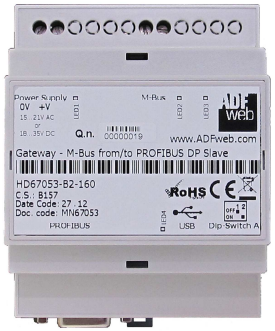
(Old Order Code: HD67053M-40, HD67053M-80, HD67053M-160, HD67053M-250)

for Website information:
www.adfweb.com?Product=HD67053

for Price information:
www.adfweb.com?Price=HD67053-B2-40
www.adfweb.com?Price=HD67053-B2-80
www.adfweb.com?Price=HD67053-B2-160
www.adfweb.com?Price=HD67053-B2-250

Benefits and Main Features:

- Very easy to configure
- Electrical isolation between PROFIBUS and M-Bus
- Industrial temperature range:
  -40°C / 70°C (-40°F / 158°F)



HD67053-B2-xxx

Similiar Products

For others M-Bus products see also the following link:

Converter M-Bus to
www.adfweb.com?Product=HD67021 **(RS232)**
www.adfweb.com?Product=HD67022 **(RS485)**
www.adfweb.com?Product=HD67030 **(Ethernet)**

Analyzer / Scanner /Sniffer M-Bus
www.adfweb.com?Product=HD67031

Extender and Repeater, M-Bus
www.adfweb.com?Product=HD67032

Gateway M-Bus / Modbus RTU
www.adfweb.com?Product=HD67029M-232 **(on RS232)**
www.adfweb.com?Product=HD67029M-485 **(on RS485)**

Gateway M-Bus / Modbus TCP
www.adfweb.com?Product=HD67044

Gateway M-Bus / CANopen
www.adfweb.com?Product=HD67051-B2

Gateway M-Bus Concentrator
www.adfweb.com?Product=HD67054M

Gateway M-Bus Slave / Modbus RTU master
www.adfweb.com?Product=HD67059M-232

Do you have an your customer protocol?
www.adfweb.com?Product=HD67003

Do you need to choose a device? do you want help?
www.adfweb.com?Cmd=helpme

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UPDATED DOCUMENTATION:

Dear customer, we thank you for your attention and we remind you that you need to check that the following document is:

- Updated
- Related to the product you own

To obtain the most recently updated document, note the "document code" that appears at the top right-hand corner of each page of this document.

With this "Document Code" go to web page www.adfweb.com/download/ and search for the corresponding code on the page. Click on the proper "Document Code" and download the updates.

To obtain the updated documentation for the product that you own, note the "Document Code" (Abbreviated written "Doc. Code" on the label on the product) and download the updated from our web site www.adfweb.com/download/

REVISION LIST:

Revision	Date	Author	Chapter	Description
1.050	29/11/2010	FI	All	Software changed (v1.501)
1.051	06/04/2011	FI	All	Revision
1.060	09/06/2011	FI	All	Software changed (v1.600)
2.000	29/06/2012	FI	All	New hardware version

WARNING:

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ADFweb.com is not responsible for any error this manual may contain.

TRADEMARKS:

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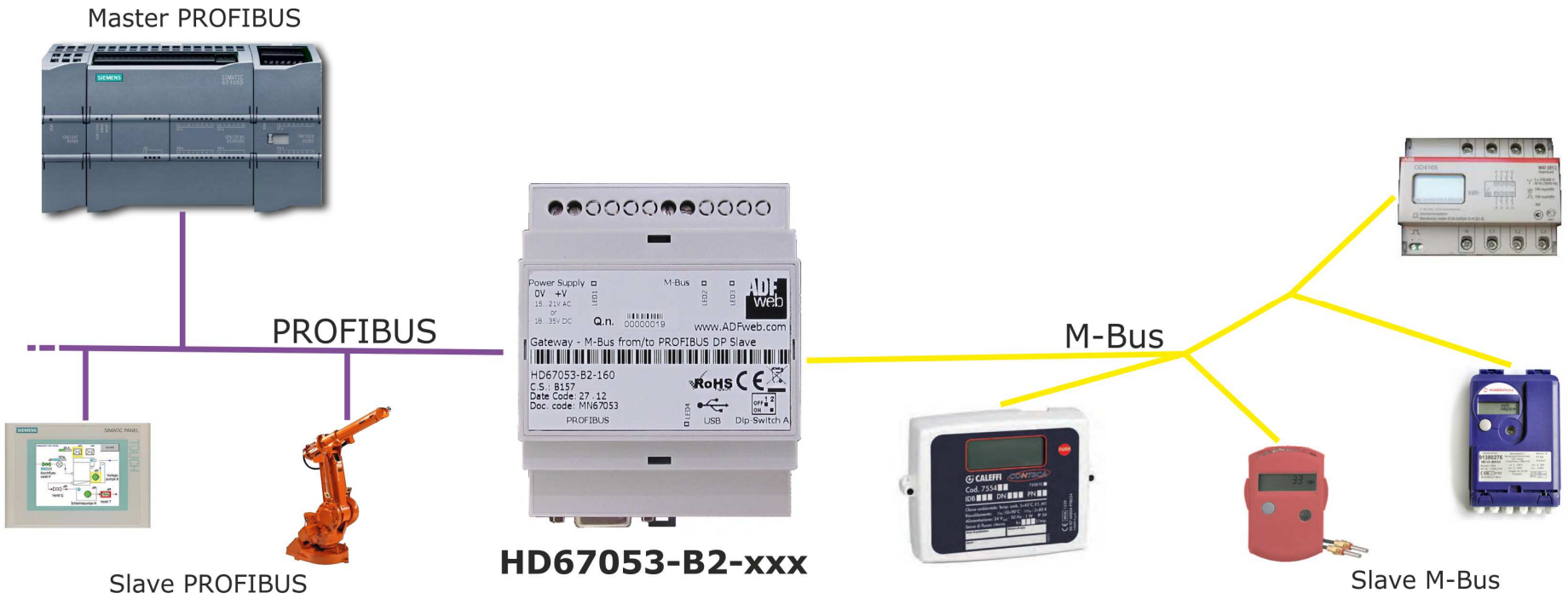
EXAMPLE OF CONNECTION:



CONNECTION SCHEME:

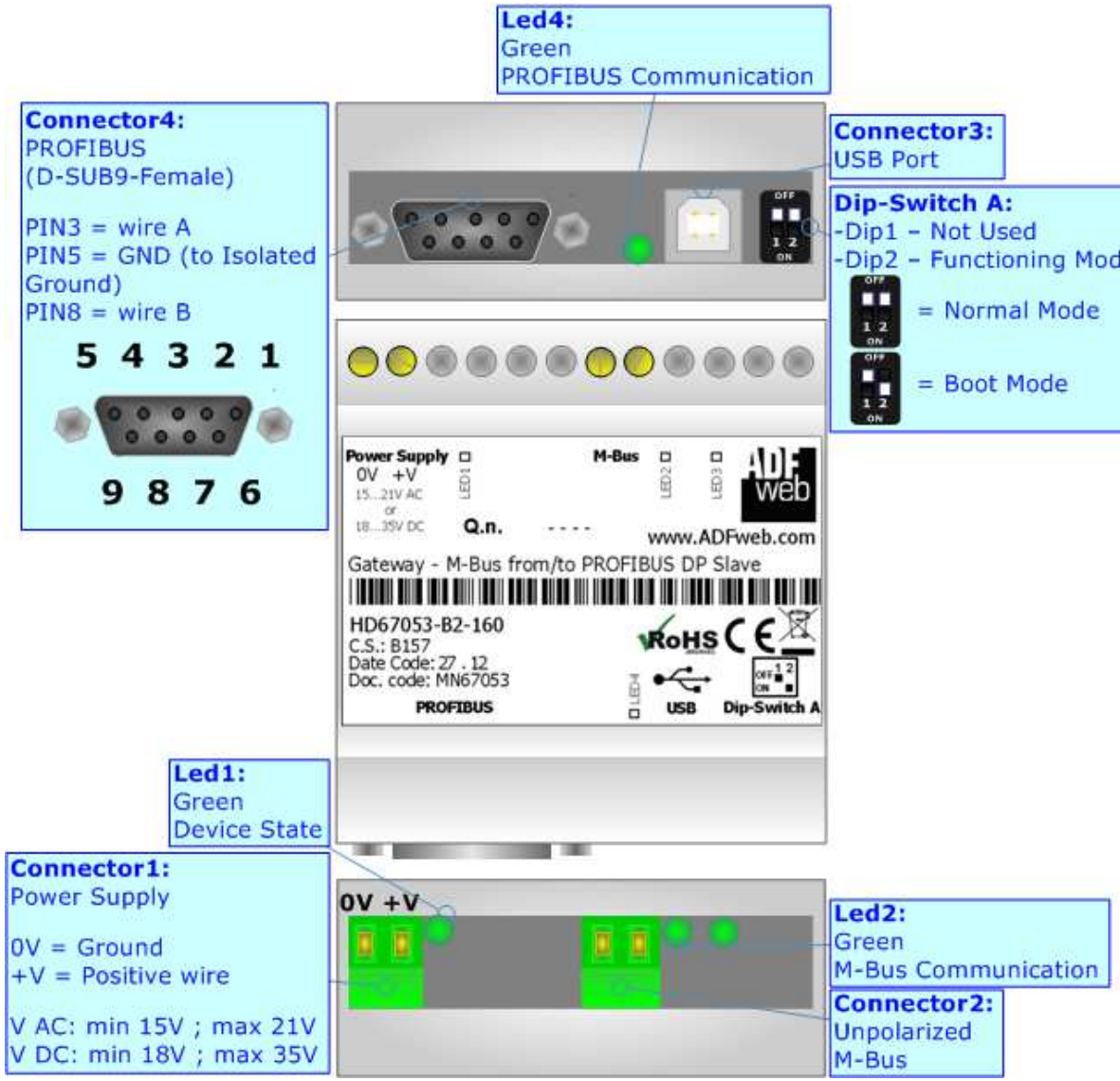


Figure 1a: Connection scheme for HD67053-B2-xxx

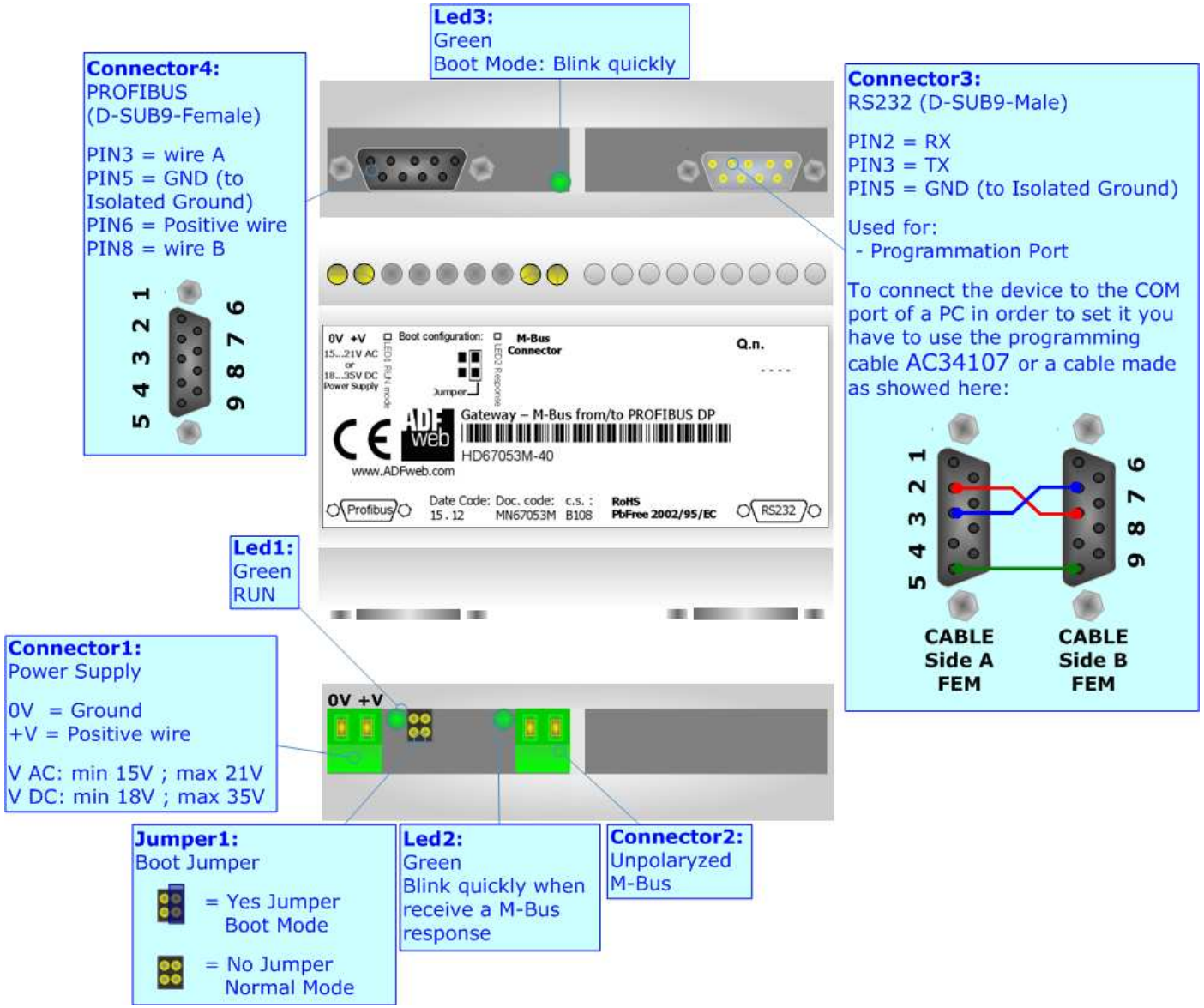


Figure 1b: Connection scheme for HD67053M-xxx

CHARACTERISTICS:

The "HD67053-B2-xxx" (newer model) and "HD67053M-xxx" (older model) are Gateway M-Bus Master from/to PROFIBUS DP line.
They allows the following characteristics:

- Electrical isolation between PROFIBUS and M-Bus;
- Mountable on 35mm DIN Rail;
- Temperature range -40°C to 70°C.

At the Gateway can be connected up to 250 standard M-Bus devices. This number depends of the code expressed by the xxx number:

- HD67053-B2-40, HD67053M-40 support up to 40 M-Bus devices;
- HD67053-B2-80, HD67053M-80 support up to 80 M-Bus devices;
- HD67053-B2-160, HD67053M-160 support up to 160 M-Bus devices;
- HD67053-B2-250, HD67053M-250 support up to 250 M-Bus devices.

In the case of HD67053M-160 the device must be mounted on 35mm DIN rail which is horizontally mounted on a wall or cabinet back-plate. To avoid obstructions to the airflow around the unit it is recommended to not cover the paths of air.

In the case of HD67053-B2-250 and HD67053M-250 the device must be mounted on 35mm DIN rail which is horizontally mounted on a wall or cabinet back-plate. This unit have a fan in the top of the enclosure. To avoid obstructions to the airflow around the unit it is recommended to not cover the paths of air. Take care to not cover the fan. It is recommended to put the device into a ventilated cabinet.

CONFIGURATION:

You need Compositor SW67053 software on your PC in order to perform the following:

- Define the parameter of PROFIBUS and M-Bus lines;
- Define the M-Bus devices on the line and select the desired values;
- Create the GSD file to import on your PLC or other;
- Update the device.

POWER SUPPLY:

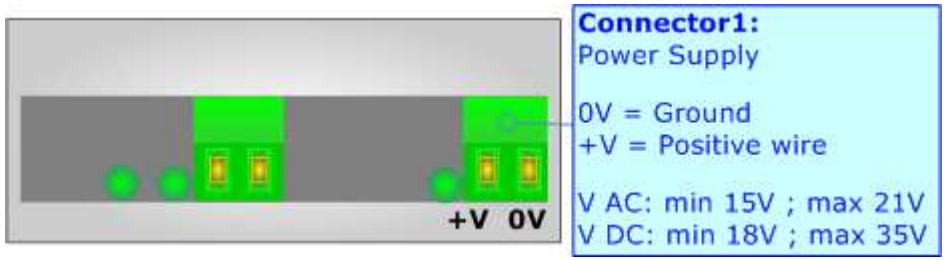
The devices can be powered at 15…21V AC and 18…35V DC. The consumption depends to the code of the device. For more details see the two tables below.

VAC ~		VDC ⎓	
Vmin	**Vmax**	**Vmin**	**Vmax**
15V	**21V**	**18V**	**35V**

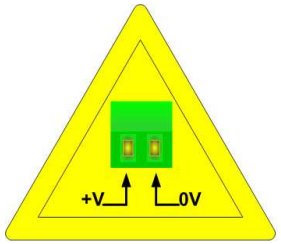
Consumption at 24V DC:

Device	No Load [W/VA]	Full Load [W/VA]*
HD67053-B2-40, HD67053M-40	3.5	5
HD67053-B2-80, HD67053M-80		8
HD67053-B2-160, HD67053M-160		14
HD67053-B2-250, HD67053M-250		30

* This value is with all the Slave M-Bus devices of the code (40, 80, 160, 250) connected to the line



Caution: Not reverse the polarity power



HD67053-B2-xxx HD67053M-xxx

FUNCTION MODES:

The device has got two functions mode depending of the position of the 'Dip2 of Dip-Switch A' of HD67053-B2-xxx or 'Jumper1' of HD6753M-xxx:

- The first, with 'Dip2 of Dip-Switch A' at "OFF" position (for HD67053-B2 series) or without any jumper inserted (for HD67053M series), is used for the normal working of the device.
- The second, with 'Dip2 of Dip-Switch A' at "ON" position (for HD67053-B2 series) or with the jumper inserted (for HD67053M series), is used for upload the Project.

For the operations to follow for the updating (see 'UPDATE DEVICE' section).

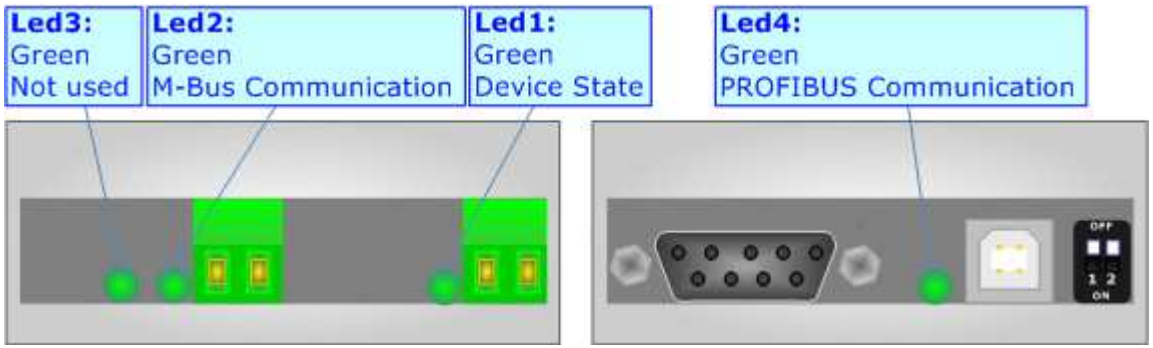
According to the functioning mode, the LEDs will have specifics functions (see 'LEDS' section).

LEDS:

HD67053-B2:

The HD67053-B2 device has got four LEDs that are used to give information of the functioning status.
The various meanings of the LEDs are described in the table below.

LED	Normal Mode	Boot Mode
1: Device State	Blinks slowly (~1Hz)	Blinks quickly
2: M-Bus Communication	Blinks quickly when a reply to a M-Bus request arrives	Blinks quickly
3: Not used	/	Blinks quickly
4: PROFIBUS Communication	Blinks quickly when the PROFIBUS is at Operational State	Blinks quickly



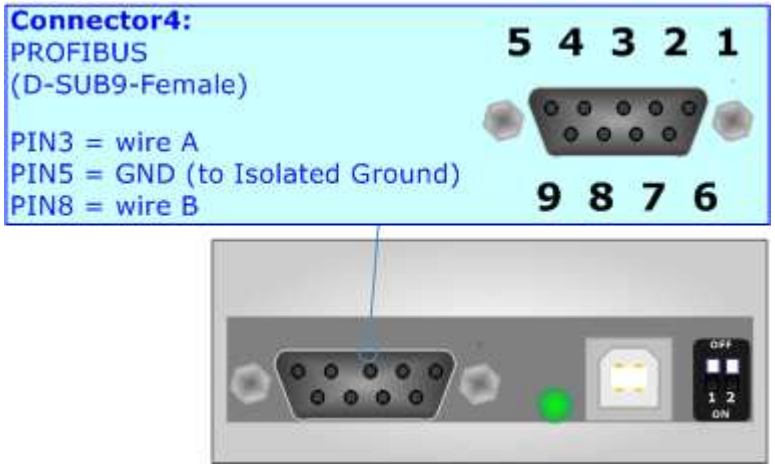
HD67053M:

The HD67053M device has got four LEDs that are used to give information of the functioning status.
The various meanings of the LEDs are described in the table below.

LED	Normal Mode	Boot Mode
1: Device State	Blinks slowly (~1Hz)	Off
2: M-Bus communication	Changes his state when a Slave Modbus has replied to the gateway request	Off
3: Device State	Off	Blinks quickly

PROFIBUS:

The PROFIBUS uses a 9-pin D-SUB connector. The pin assignment is defined like in the right figure.

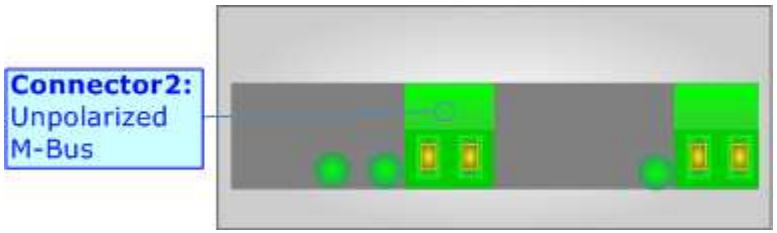


Here some codes of cables:

- Belden: p/n 183079A - Continuous Armor DataBus® ISA/SP-50 PROFIBUS Cable;

M-BUS:

The M-Bus is a unpolarized bus.
A two wire standard telephone cable (JYStY N*2*0.8 mm) is used as the transmission medium for the M-Bus. The maximum distance between a slave and the repeater is 350m; this length corresponds to a cable resistance of up 29Ω. This distance applies for the standard configuration having Baud rates between 300 and 9600 Baud, and a maximum of 250 slaves. The maximum distance can be increased by limiting the Baud rate and using fewer slaves, but the bus voltage in the space state must at no point in a segment fall below 12V, because of the remote powering of the slaves. In the standard configuration the total cable length should not exceed 1000m, in order to meet the requirement of a maximum cable capacitance of 180nF. *(Taken from M-Bus specifics)*



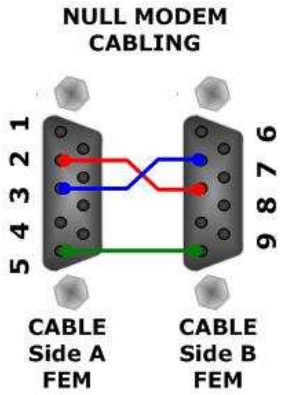
USB (ONLY FOR HD67053-B2-XXX SERIES):

The USB connector (Connector3) of HD67053-B2-xxx is a Type-B Female. So the cable must be a Type-B Male.
The USB port is used for programming the device.

RS232 (ONLY FOR HD67053M-XXX SERIES):

The connection from RS232 socket to a serial port (example one from a personal computer), must be made with a Null Modem cable (a serial cable where the pins 2 and 3 are crossed). It is recommended that the RS232C Cable not exceed 15 meters.

The serial port is used for programming the device.



USE OF COMPOSITOR SW67053:

To configure the Gateway, use the available software that runs with Windows, called SW67053. It is downloadable on the site www.adfweb.com and its operation is described in this document. *(This manual is referenced to the last version of the software present on our web site)*. The software works with MSWindows (MS 2000, XP, Vista, Seven).

When launching the SW67053 the right window appears (Fig. 2).

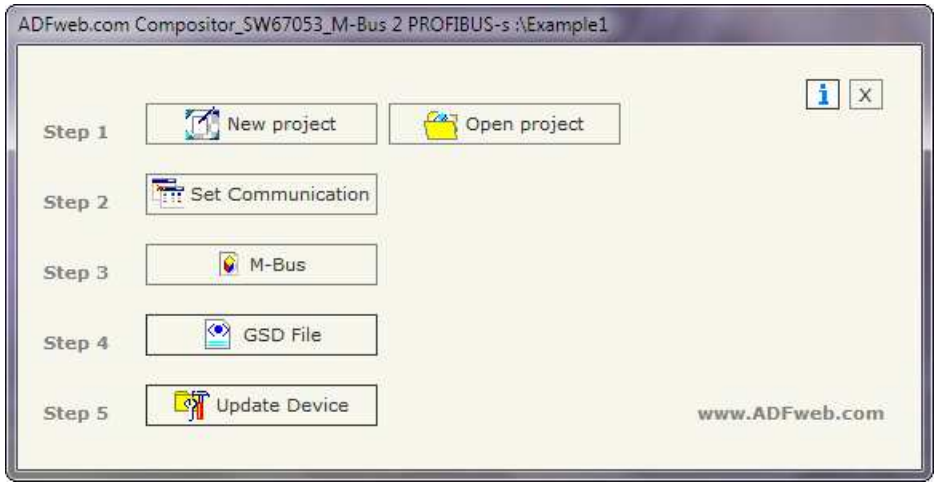
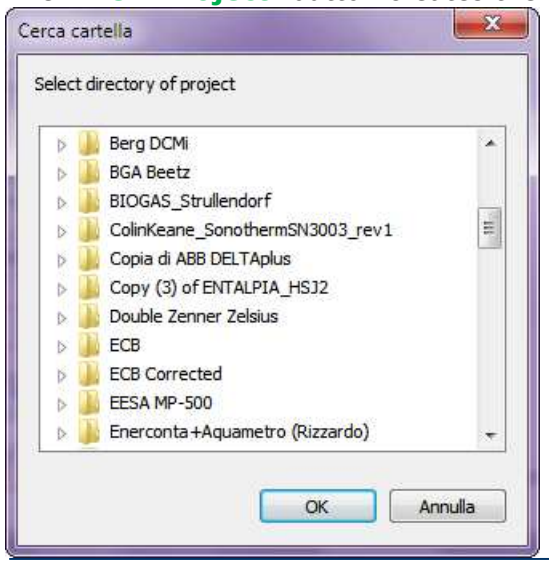


Figure 2: Main window for SW67053

NEW PROJECT / OPEN PROJECT:

The "**New Project**" button creates the folder which contains the entire device configuration.



A device configuration can also be imported or exported:

- To clone the configurations of a Programmable M-Bus to PROFIBUS Gateway in order to configure another device in the same manner, it is necessary to maintain the folder and all its contents;
- To clone a project in order to obtain a different version of the project, it is sufficient to duplicate the project folder with another name and open the new folder with the button "**Open Project**".

SET COMMUNICATION:

This section define the fundamental communication parameters of two Buses, PROFIBUS and M-Bus.

By Pressing the "**Set Communication**" button from the main window for SW67053 (Fig. 2) the window "Set Communication" appears (Fig. 3).
The window is divided in three sections, one for the PROFIBUS, one for the M-Bus and the last for selecting the hardware used.

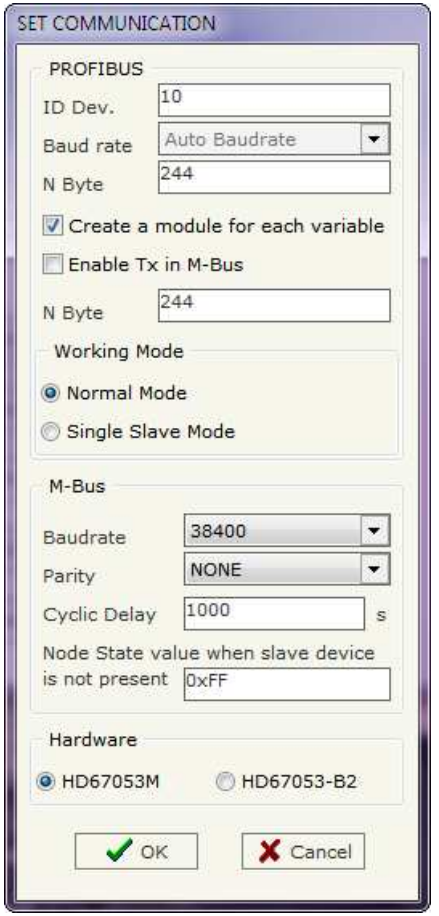


Figure 3: "Set Communication" window

The means of the fields for PROFIBUS are:

- In the field "**ID Dev.**" The ID for the PROFIBUS side is defined;
- In the field "**N Byte**" insert number of input byte of PROFIBUS;
- If the "**Create a module for each variable**" is checked in the GSD file will be created in many modules as there are variables defined in the "M-Bus" section; otherwise it will created modules with the maximum size of 64 byte;
- If the field "**Enable Tx in M-Bus**" is checked it is possible to sent M-Bus frames by writing the output bytes of PROFIBUS;
- In the field "**N Byte**" insert the number of output byte of PROFIBUS;
- If "**Normal Mode**" is checked the 244 bytes of PROFIBUS are used for storing the data of all M-Bus slaves; otherwise if "**Single Slave Mode**" is checked, all 244 bytes are used for storing the data of a single slave (see section "Single Slave Mode Functioning" at page 22 for more details).

The means of the fields for M-Bus are:

- In the field "**Baudrate**" it is possible to select the baudrate of the M-Bus line;
- In the field "**Parity**" it is possible to select the parity of the line;
- In the field "**Cyclic Delay**" insert the time (expressed in seconds) between two scans;
- In the field "**Node State value when slave device is not present**" it is possible to insert the value to assign to the "Node State" when the Gateway doesn't find the interrogated slave M-Bus.

The means of the fields for Hardware are:

- If the hardware in your possession is the HD67053M-xxx you have to select "**HD67053M**"; otherwise if the hardware in your possess is the HD67053-B2-xxx you have to select "**HD67053-B2**".

M-BUS:

By Pressing the "**M-Bus**" button from the main window for SW67053 (Fig. 2) the window "M-Bus Network" appears (Fig. 4).

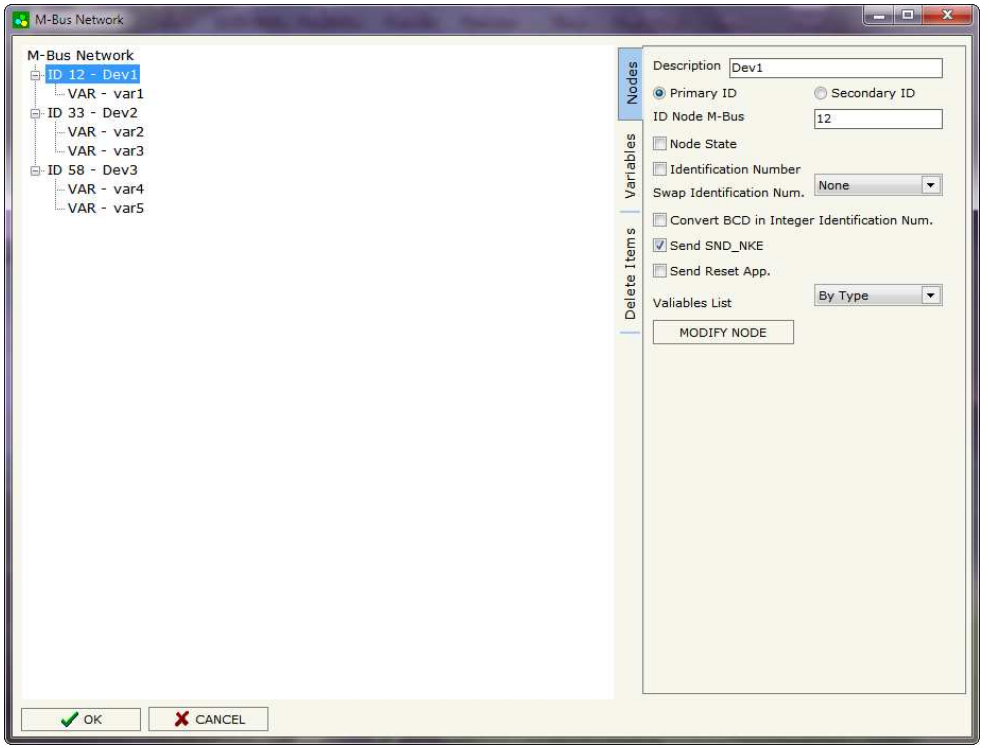


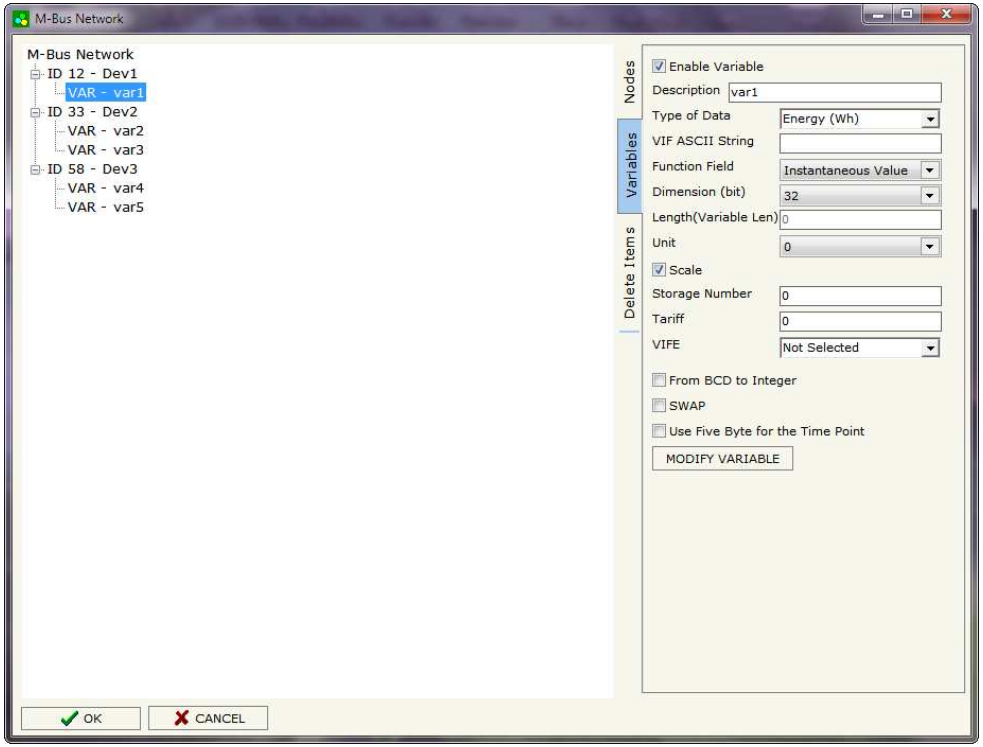
Figure 4: "M-Bus Network" window

SECTION NODES:

In the section "Nodes" it is possible to create the nodes of M-Bus line. In order to create a new node it is necessary to select which address use, selecting "Primary ID" or "Secondary ID", to makes the requests and then insert the "Primary Address" (from 1 to 250) or the "Secondary Address" (from 0 to 99999999) of M-Bus device in the field "**ID Node M-Bus**". In the field "**Description**" it is possible to write a short description of the node.
If the field "**Node State**" is checked the gateway reserve one byte at the starting of PROFIBUS IN data array and saves the status of the counter.
If the field "**Identification Number**" is checked the gateway reserve four bytes at the starting of PROFIBUS IN data array and saves the Secondary Address of the device.
In the field "**Swap Identification Num.**" it is possible to select the swap mode of the Identification Number. If swap isn't necessary you have to select "None"; otherwise see the section "Swap Identification" (page 23) of this document for select the swap mode.
If the field "**Convert BCD in Integer Identification Num.**" is checked the gateway converts the Identification Number that is normally expressed in BCD in a Integer Number and saves the number in the reserved positions.
If the field "**Send SND_NKE**" is checked, the Gateway send the "SND_NKE" frame to start the communication.
In the field "**Send Reset App.**" Is checked the gateway send the "Application Reset" command to the slave.
In the field "**Variables List**" it is possible to select which type of variables definition to use. If is selected "By Type" it is necessary to fill all fields, in the section Variables, with the correct values; otherwise if "By Position" is selected you can insert the progressive number of the variable that you need (page 18 for more information).
After that, pressing the "***ADD NODE***" button, a new node appears in the left side of the window.
In order to modify a created node it is necessary to select the desired node, change the wrong items and then press the "***MODIFY NODE***" button.

SECTION VARIABLES (BY TYPE):

Selecting the desired node it is possible to add a variable. In order to create a new variable it is necessary to fill these items:



- To use the created variable the field "**Enable Variable**" must be checked. If you have created a variable but for the moment it is unused it is possible to uncheck the field "Enable Variable" without delete it;
- In the field "**Description**" it is possible to write a description of the variable (it isn't a necessary information, it helps the readability of the tree of network);
- The field "**Type of Data**" is used to select the unit of measure;
- In the field "**VIF ASCII String**" insert the string of VIF. It is possible to use this field only if the "Type of Data" is "VIF is in ASCII";
- In the field "**Function Field**" it is necessary to select the type of data;
- The field "**Dimension**" is used to select the dimension of the variable (8, 16, 24, 32, 32 real, 48, 64 bit);
- In the field "***Length(Variable Len)***" insert the length of the data in the case of the dimension is "Variable Length";
- In the field "**Unit**" if it is necessary it is possible to select the unit of that variable. The Unit is used for indicates from which device the data come;
- If the field "**Scale**" is checked the software reserved a byte in the PROFIBUS and in this field it write the Scale of measure. If the scale is not necessary, you can unselect it;
- In the field "**Storage Number**" if it is necessary it is possible to insert the value of storage counter of that variable. With this field the slave can indicate and transmit various stored counter states or historical values, in the order in which they occur;
- In the field "**Tariff**" if it is necessary it is possible to insert the value of the tariff of that variable. The Tariff is used for indicates from which device the data come;
- In the field "**VIFE**" it is possible to select a sub-type of "Type of Data";
- If the field "**From BCD to Integer**" is checked the Gateway converts the BCD value of variable in Integer format. This happens only if the variable is in BCD format; if it isn't nothing changes;
- If the field "**SWAP**" is checked the byte of data of that variable are swapped. Example: from 0x01020304 to 0x04030201;

- If the field "**Use Five Bytes for the Time Point**" and the "Type of Data" is "Time Point" it is possible to read the information of Year, Month, Day, Hour, Minutes on five consecutive positions of the array without decoding (if not selected the values are the same of the reply of the slave device, so coded with a determinate structure (page 25 for more information)).

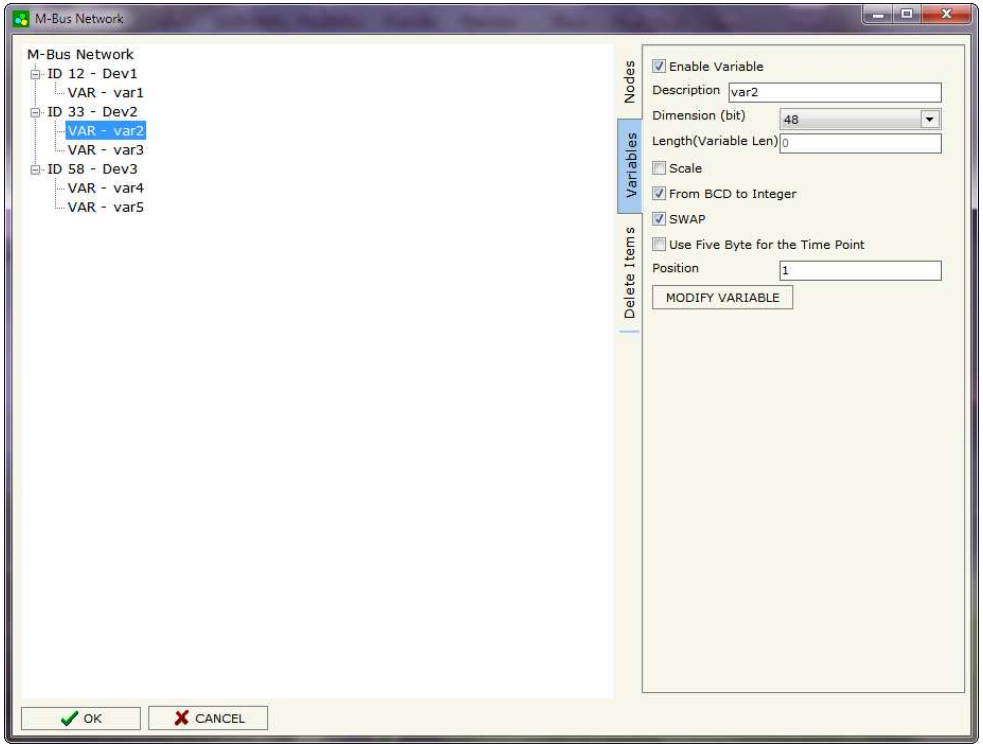
Having completed these fields, to add the variable the button "***ADD VARIABLE***" must be pressed.

In order to modify a created variable it is necessary to select the desired variable, change the wrong items and then press the "***MODIFY VARIABLE***" button.

SECTION VARIABLES (BY POSITION):

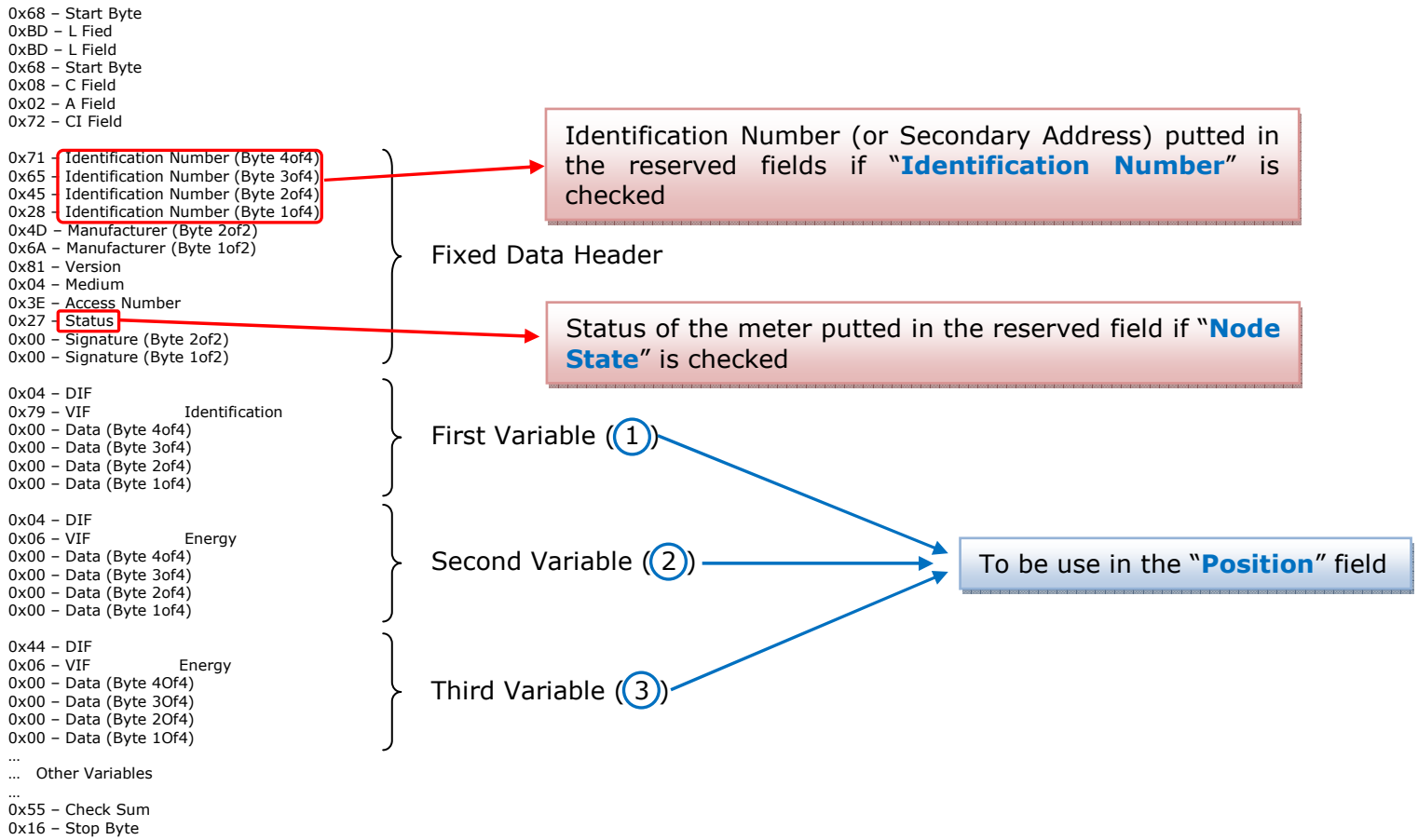
Selecting the desired node it is possible to add a variable. In order to create a new variable it is necessary to fill these items:

- To use the created variable the field "**Enable Variable**" must be checked. If you have created a variable but for the moment it is unused it is possible to uncheck the field "Enable Variable" without delete it;
- In the field "**Description**" it is possible to write a description of the variable (it isn't a necessary information, it helps the readability of the tree of network);
- The field "**Dimension**" is used to select the dimension of the variable (8, 16, 24, 32, 32 real, 48, 64 bit);
- In the field "***Length(Variable Len)***" insert the length of the data in the case of the dimension is "Variable Length";
- If the field "**Scale**" is checked the software reserved a byte in the PROFIBUS and in this field it write the Scale of measure. If the scale is not necessary, you can unselect it;
- If the field "**From BCD to Integer**" is checked the Gateway converts the BCD value of variable in Integer format. This happens only if the variable is in BCD format; if it isn't nothing changes;
- If the field "**SWAP**" is checked the byte of data of that variable are swapped. Example: from 0x01020304 to 0x04030201;



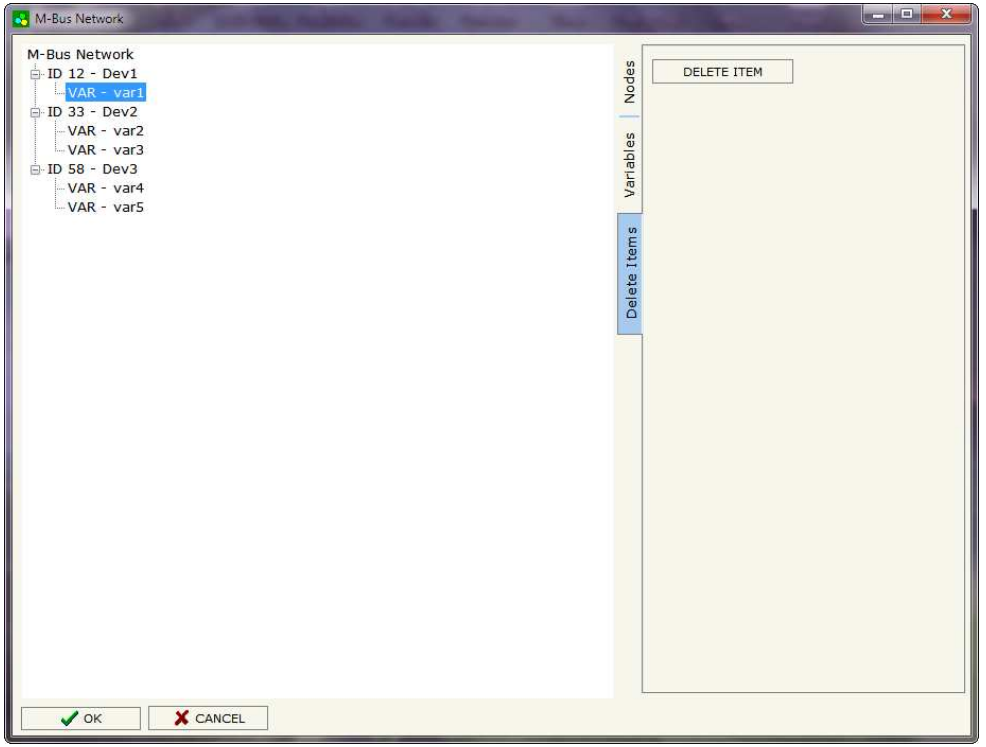
- If the field "**Use Five Bytes for the Time Point**" and the "Type of Data" is "Time Point" it is possible to read the information of Year, Month, Day, Hour, Minutes on five consecutive positions of the array without decoding (if not selected the values are the same of the reply of the slave device, so coded with a determinate structure (page 25 for more information));
- In the field "**Position**" insert the number of the variable that you want on PROFIBUS.

Example:


0x68 – Start Byte
0xBD – L Fied
0xBD – L Field
0x68 – Start Byte
0x08 – C Field
0x02 – A Field
0x72 – CI Field
0x71 – Identification Number (Byte 4of4)
0x65 – Identification Number (Byte 3of4)
0x45 – Identification Number (Byte 2of4)
0x28 – Identification Number (Byte 1of4)
0x4D – Manufacturer (Byte 2of2)
0x6A – Manufacturer (Byte 1of2)
0x81 – Version
0x04 – Medium
0x3E – Access Number
0x27 – Status
0x00 – Signature (Byte 2of2)
0x00 – Signature (Byte 1of2)
Fixed Data Header
Identification Number (or Secondary Address) putted in the reserved fields if "Identification Number" is checked
Status of the meter putted in the reserved field if "Node State" is checked
0x04 – DIF
0x79 – VIF Identification
0x00 – Data (Byte 4of4)
0x00 – Data (Byte 3of4)
0x00 – Data (Byte 2of4)
0x00 – Data (Byte 1of4)
First Variable (1)
0x04 – DIF
0x06 – VIF Energy
0x00 – Data (Byte 4of4)
0x00 – Data (Byte 3of4)
0x00 – Data (Byte 2of4)
0x00 – Data (Byte 1of4)
Second Variable (2)
0x44 – DIF
0x06 – VIF Energy
0x00 – Data (Byte 4Of4)
0x00 – Data (Byte 3Of4)
0x00 – Data (Byte 2Of4)
0x00 – Data (Byte 1Of4)
Third Variable (3)
…
… Other Variables
…
0x55 – Check Sum
0x16 – Stop Byte
To be use in the "Position" field

SECTION DELETE ITEMS:

If it is necessary to delete a node or a variable, you have to select the node or the variable and then press the "**DELETE ITEM**" button.



Possible choices for the fields used to create a variable:

Type of Data:
|_Energy (Wh)
|_Energy (J)
|_Volume (m^3)
|_Mass (Kg)
|_On Time
|_Operating Time
|_Power (W)
|_Power (J/h)
|_Volume Flow (m^3/h)
|_Volume Flow Ext. (m^3/min)
|_Volume Flow Ext. (m^3/s)
|_Mass Flow (Kg/h)
|_Flow Temperature (°C)
|_Return Temperature (°C)
|_Temperature Difference (K)
|_External Temperature (°C)
|_Pressure (bar)
|_Averaging Duration
|_Actuality Duration
|_Type of data in VIFE
|_Time Point
|_VIF is in ASCII
|_Unit for H.C.A.
|_Fabrication No
|_(Enhaced) Identification
|_Bus Address

Function Field:
|_Instantaneous Value
|_Minimum Value
|_Maximum Value
|_Value During Error State

Dimension (bit):
|_8
|_16
|_24
|_32
|_32 real
|_48
|_64
|_Variable Length

VIFE:

|_ Not Selected
|_ Credit of the nominal local legal currency units
|_ Debit of the nominal local legal currency units
|_ Access Number (transmission count)
|_ Medium (as in fixed header)
|_ Manufacturer (as in fixed header)
|_ Parameter set identification
|_ Model/Version
|_ Hardware Version #
|_ Firmware Version #
|_ Software Version #
|_ Customer Location
|_ Customer
|_ Access Code User
|_ Access Code Operator
|_ Access Code System Operator
|_ Access Code Developer
|_ Password
|_ Error flags (binary)
|_ Error mask
|_ Digital Output (binary)
|_ Digital Input (binary)
|_ Baudrate [Baud]
|_ response delay time [bittimes]
|_ Retry
|_ First storage # for cyclic storage
|_ Last storage # for cyclic storage
|_ Size of storage block
|_ Storage interval [sec(s)..day(s)]
|_ Storage interval month(s)
|_ Storage interval year(s)
|_ Duration since last readout[sec(s)..day(s)]
|_ Start (date/time) of tariff
|_ Duration of tariff (nn=01..11:min to day)
|_ Period of tariff [sec(s) to day(s)]
|_ Period of tariff months(s)
|_ Period of tariff year(s)
|_ dimensionless/ no VIF
|_ Volts
|_ Ampere
|_ Reset counter
|_ Comulation counter
|_ Control signal
|_ Day of week
|_ Week number
|_ Time point of day change
|_ State of parameter activation
|_ Special supplier information
|_ Duration since last comulation [hour(s)..year(s)]
|_ Operation time battery [hour(s)..year(s)]
|_ Date and time of battery change
|_ Energy MWh
|_ Energy GJ
|_ Volume
|_ Mass
|_ Volume 0,1 feet^3
|_ Volume 0,1 american gallon
|_ Volume 1 american gallon
|_ Volume flow 0,001 american gallon/min
|_ Volume flow 1 american gallon/min
|_ Volume flow 1 american gallon/h
|_ Power MW
|_ Power GJ/h
|_ Flow Temperature
|_ Return Temperature
|_ Temperature Difference
|_ External Temperature
|_ Cold/Warm Temperature Limit °F
|_ Cold/Worm Temperature Limit °C
|_ Cumul. Count max power
|_ per second

|_ per minute
|_ per hour
|_ per day
|_ per week
|_ per month
|_ per year
|_ per revolution/measurement
|_ increment per input pulse on input channel
|_ increment per output pulse on output channel
|_ per liter
|_ per m^3
|_ per kg
|_ per K (Kelvin)
|_ per kWh
|_ per GJ
|_ per kW
|_ per (K*l)(Kelvin*liter)
|_ per V (Volt)
|_ per A (Ampere)
|_ multiplied by sek
|_ multiplied by sek/V
|_ multiplied by sek/A
|_ start date(/time) of
|_ VIF contains uncorrected unit instead of corrected unit
|_ Accumulation only if positive contributions
|_ Accumulation of abs value only if negative contributions
|_ upper/lower limit value

|_ # of exceeds of lower/upper limit
|_ Date(/time) of begin/end of first/last lower/upper limit exceed
|_ Duration of limit exceed
|_ Duration of first/last
|_ Date(/time) of first/last begin/end
|_ Multiplicative □orrection factor
|_ Additive correction constant * unit of VIF (offset)
|_ Moltiplicative correction factor: 10^3
|_ future value
|_ next VIFE's and data of this block are manufacturer specific
|_ None
|_ Too many DIFE's
|_ Storage number not implemented
|_ Unit number not implemented
|_ Tariff number not implemented
|_ Function not implemented
|_ Data class not implemented
|_ Data size not implemented
|_ Too many VIFE's
|_ Illegal VIF-Group
|_ Illegal VIF-Exponent
|_ VIF/DIF mismatch
|_ Unimplemented action
|_ No data available (undefined value)
|_ Data overflow
|_ Data underflow
|_ Data error
|_ Premature end of record

Swap Identification:

This field is used for select the Swap mode of Identification Number.

At the moment there are these possibilities:

- None;
- Type 1.

Examples:

- Identification Number (Secondary Address): 28456571; Convert BCD in Integer Identification Num. Not checked.

None	Type 1
0x28	0x65
0x45	0x71
0x65	0x28
0x71	0x45

- Identification Number (Secondary Address): 28456571; Convert BCD in Integer Identification Num. Checked.

None	Type 1
0x01	0x36
0xB2	0x7B
0x36	0x01
0x7B	0xB2

To know the meaning of value read in the "Scale" byte position, you must follow this table (x = Value read in Scale location):

Description	Range Coding	Range
Energy	$10^{(x-3)}$ Wh	0.001 Wh to 10000 Wh
Energy	$10^{(x)}$ J	0.001 kJ to 10000 kJ
Volume	$10^{(x-6)}$ m^3	0.001 l to 10000 l
Mass	$10^{(x-3)}$ kg	0.001 kg to 10000 kg
On Time	x = 0 Seconds x = 1 Minutes x = 2 Hours x = 3 Days	
Operating Time	coded like On Time	
Power	$10^{(x-3)}$ W	0.001 W to 10000 W
Power	$10^{(x)}$ J/h	0.001 kJ/h to 10000 kJ/h
Volume Flow	$10^{(x-6)}$ m^3/h	0.001 l/h to 10000 l/h
Volume Flow Ext.	$10^{(x-7)}$ m^3/min	0.0001 l/min to 1000 l/min
Volume Flow Ext.	$10^{(x-9)}$ m^3/s	0.001 ml/s to 10000 ml/s
Mass Flow	$10^{(x-3)}$ kg/h	0.001 kg/h to 10000 kg/h
Flow Temperature	$10^{(x-3)}$ °C	0.001 °C to 1 °C
Return Temperature	$10^{(x-3)}$ °C	0.001 °C to 1 °C
Temperature Difference	$10^{(x-3)}$ K	1 mK to 1000 mK
External Temperature	$10^{(x-3)}$ °C	0.001 °C to 1 °C
Pressure	$10^{(x-3)}$ bar	1 mbar to 1000 mbar
Averaging Duration	coded like On Time	
Actuality Duration	coded like On Time	
Time Point	x = 0 Date x = 1 Time&Date	Data type G Data type F
Unit for H.C.A.		dimensionless

Data type F:

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	21^0	2^9	2^8
2^{23}	2^{22}	2^{21}	22^0	2^{19}	2^{18}	2^{17}	2^{16}
2^{31}	2^{30}	2^{29}	2^{28}	2^{27}	2^{26}	2^{25}	2^{24}

Min (0 ... 59);
Hour (0 ... 23);
Day (1 ... 31);
Month (1 ... 12);
Year (0 ... 99);
Time Invalid (0=Valid, 1=Invalid);
Summer Time (0=Standard Time, 1=Summer Time);
Reserved (0).

Data type G:

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	21^0	2^9	2^8

Day (1 ... 31);
Month (1 ... 12);
Year (0 ... 99).

FUNCTIONING OF ENABLE TX IN M-BUS:

When the field "Enable Tx in M-Bus" is checked from "Set Communication" it is necessary to follow these instructions for writing something in M-Bus.

Example of PROFIBUS IN array (data that a master PROFIBUS receive)

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
SO	RIS	Data …	…	…	…	… Data

Example of PROFIBUS OUT array (data that a master PROFIBUS send)

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
LEN	WRITE	Data to write…	…	…	…	Data to write

The field "SO" is the Operation State. It can assume four values:

- $00: Idle;
- $01: Writing;
- $02: Writing executed, waiting reply;
- $03: Now is possible to read the RIS.

The field "RIS" is the result of the writing operation. It can assume these values:

- $00: Idle;
- $FF: The slave hasn't replied;
- Any other value: The first byte of the reply of the slave (usually the slave reply with a single byte $E5).

In the field "LEN" you have to insert the length of the frame that you want to send.

The field "WRITE" can assume two values:

- $00: Idle;
- $01: Write;
- Any other value is not considered.

From Byte 2 to Byte 2+N Byte-2 you have to insert the frame to send.

When the gateway starts the SO and RIS are in "Idle". The PROFIBUS master has to set the LEN and all the "Data to Write". Then it is possible to set the "WRITE" from 0 to 1. When the gateway complete the operations it set the SO to $03 and the RIS with a value; in this moment (SO is $03) it is possible to take the RIS like 'correct'. Now the master PROFIBUS has to set the "WRITE" from 1 to 0 and the gateway put in "Idle" the SO and RIS. Now it is possible to repeat the writing operation.

SINGLE SLAVE MODE FUNCTIONING:

By checking the field "Single Slave Mode" it is possible to save 240 bytes of data for a single M-Bus Slave Device.
With this mode selected it isn't possible to use the "Create a module for each variable", so are created modules with the maximum size of 64 byte.
It is necessary to insert in the field "N Byte" under "Enable Tx in M-Bus" at least the value 4.
For having the data it is necessary that the Master PROFIBUS writes the first four bytes of his Output Data with the Primary or Secondary Address of the slave which want to receive the data.

Example of PROFIBUS OUT array (data that a master PROFIBUS send) using the Primary Address of the Slave M-Bus

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
0x00	0x00	0x00	0x3A	Empty or other values	Empty or other values	Empty or other values

Example of PROFIBUS OUT array (data that a master PROFIBUS send) using the Secondary Address of the Slave M-Bus

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
0x28	0x45	0x65	0x71	Empty or other values	Empty or other values	Empty or other values

If the address is defined in the section M-Bus and the reply frame of the slave interrogated is received, the gateway puts the requested address in the first four bytes, if the "Enable Tx in M-Bus" is unchecked, or in the third, fouth, fifth and sixth if the field "Enable Tx in M-Bus" is unchecked. Then follow the normal data of the selected slave.

Example of PROFIBUS IN array (data that a master PROFIBUS receive) using the Primary Address of the Slave M-Bus without "Enable Tx in M-Bus" checked

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
0x00	0x00	0x00	0x3A	Data …	…	… Data

Example of PROFIBUS IN array (data that a master PROFIBUS receive) using the Secondary Address of the Slave M-Bus with "Enable Tx in M-Bus" checked

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
SO	RIS	0x28	0x45	0x65	0x71	Data …	…	… Data

EXAMPLES:

1)

In "Set Communication" the field "Create a module for each variable" and "Enable Tx in M-Bus" are unchecked, "N Byte" is 30, "Node State" and "Identification Number" are unchecked.

There was defined these variables: **Var.1**: 32 bit, No Scale; **Var.2**: 48 bit, No Scale; **Var.3**: 16 bit, Si Scale; **Var.4**: 64 bit, Si scale.

The PROFIBUS array is the follow:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Var.1	Var.1	Var.1	Var.1	Var.2	Var.2	Var.2	Var.2	Var.2	Var.2
Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18	Byte 19
Var.3	Var.3	Var.3 Scale	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4
Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29
Var.4	Var.4 Scale								

2)

In "Set Communication" the field "Create a module for each variable" is checked, "Enable Tx in M-Bus" is unchecked, "Node State" and "Identification Number" are unchecked.

There was defined these variables: **Var.1**: 24 bit, No Scale; **Var.2**: 32 bit, Yes Scale; **Var.3**: 16 bit, No Scale; **Var.4**: 64 bit, Yes scale; **Var.5**: 8 bit, Yes scale.

The PROFIBUS array is the follow:

Byte 0	Byte 1	Byte 2
Var.1	Var.1	Var.1

Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Var.2	Var.2	Var.2	Var.2	Var.2 Scale

Byte 8	Byte 9
Var.3	Var.3

Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18
Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4 Scale

Byte 19	Byte 20
Var.5	Var.5 Scale

3)
In "Set Communication" the field "Create a module for each variable" and "Enable Tx in M-Bus" are unchecked, "N Byte" is 30, "Node State" and "Identification Number" are checked.
There was defined these variables: **Var.1**: 32 bit, No Scale; **Var.2**: 48 bit, No Scale; **Var.3**: 16 bit, Si Scale; **Var.4**: 64 bit, Si scale.
The PROFIBUS array is the follow:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Status	Ident.Num1	Ident.Num2	Ident.Num3	Ident.Num4	Var.1	Var.1	Var.1	Var.1	Var.2
Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18	Byte 19
Var.2	Var.2	Var.2	Var.2	Var.2	Var.3	Var.3	Var.3 Scale	Var.4	Var.4
Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29
Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4 Scale			

4)
In "Set Communication" the field "Create a module for each variable" is checked, "Enable Tx in M-Bus" is unchecked, "Node State" and "Identification Number" are checked.
There was defined these variables: **Var.1**: 24 bit, No Scale; **Var.2**: 32 bit, Yes Scale; **Var.3**: 16 bit, No Scale; **Var.4**: 64 bit, Yes scale; **Var.5**: 8 bit, Yes scale.
The PROFIBUS array is the follow:

Byte 0
Status

Byte 1	Byte 2	Byte 3	Byte 4
Ident.Num1	Ident.Num2	Ident.Num3	Ident.Num4

Byte 5	Byte 6	Byte 7
Var.1	Var.1	Var.1

Byte 8	Byte 9	Byte 10	Byte 11	Byte 12
Var.2	Var.2	Var.2	Var.2	Var.2 Scale

Byte 13	Byte 14
Var.3	Var.3

Byte 15	Byte 16	Byte 17	Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23
Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4 Scale

Byte 24	Byte 25
Var.5	Var.5 Scale

5)
In "Set Communication" the field "Create a module for each variable" is unchecked, "Enable Tx in M-Bus" is checked, "N Byte" is 30, "Node State" is unchecked and "Identification Number" is checked.
There was defined these variables: **Var.1**: 32 bit, No Scale; **Var.2**: 48 bit, No Scale; **Var.3**: 16 bit, Si Scale; **Var.4**: 64 bit, Si scale.
The PROFIBUS array is the follow:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
SO	RIS	Ident.Num1	Ident.Num2	Ident.Num3	Ident.Num4	Var.1	Var.1	Var.1	Var.1
Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18	Byte 19
Var.2	Var.2	Var.2	Var.2	Var.2	Var.2	Var.3	Var.3	Var.3 Scale	Var.4
Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29
Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4 Scale		

6)
In "Set Communication" the field "Create a module for each variable" and "Enable Tx in M-Bus" are checked, "Node State" is checked and "Identification Number" is unchecked.
There was defined these variables: **Var.1**: 24 bit, No Scale; **Var.2**: 32 bit, Yes Scale; **Var.3**: 16 bit, No Scale; **Var.4**: 64 bit, Yes scale; **Var.5**: 8 bit, Yes scale.
The PROFIBUS array is the follow:

Byte 0	Byte 1
SO	RIS
Byte 2	
Status	
Byte 3	Byte 4	Byte 5
Var.1	Var.1	Var.1
Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
Var.2	Var.2	Var.2	Var.2	Var.2 Scale
Byte 11	Byte 12
Var.3	Var.3
Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18	Byte 19	Byte 20	Byte 21
Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4	Var.4 Scale
Byte 22	Byte 23
Var.5	Var.5 Scale

UPDATE DEVICE:

By pressing the "**Update Device**" button it is possible to load the created Configuration into the device; and also the Firmware, if is necessary.

In order to load the parameters or update the firmware in the device, follow these instructions:

- Turn off the Device;
- Connect the USB cable (HD67053-B2 series) or the RS232 Null Modem Cable (HD67053M series) form your PC to the Gateway;
- Put Dip2 of Dip-Switch A at "ON" position (HD67053-B2 series) or Insert the Boot Jumper (HD67053M) (see "FUNCTION MODES" section);
- Select the "**COM port**" and press the "**Connect**" button;
- Turn on the device;
- Check the BOOT Led. It must blink quickly (see "LEDS" section);
- Press the "**Next**" button;
- Select which operations you want to do.
- Press the "**Execute update firmware**" button to start the upload;
- When all the operations are "OK" turn off the device;
- Put Dip2 of Dip-Switch A at "OFF" position or disconnect the Boot jumper;
- Disconnect the USB or RS232 Cable;
- Turn on the device.

At this point the configuration/firmware on the device is correctly update.

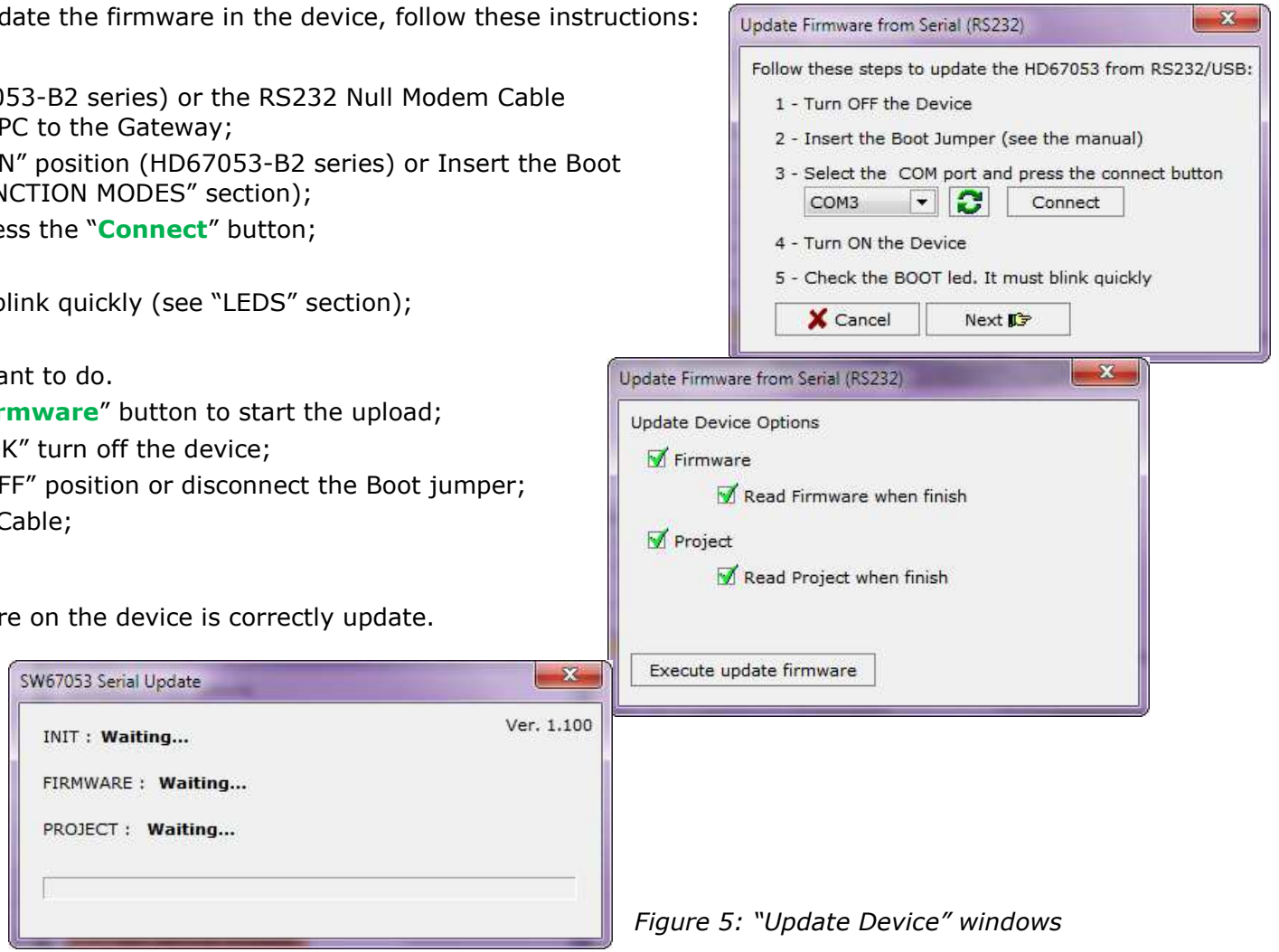

Update Firmware from Serial (RS232)
Follow these steps to update the HD67053 from RS232/USB:
1 - Turn OFF the Device
2 - Insert the Boot Jumper (see the manual)
3 - Select the COM port and press the connect button
COM3
Connect
4 - Turn ON the Device
5 - Check the BOOT led. It must blink quickly
Cancel
Next
Update Firmware from Serial (RS232)
Update Device Options
Firmware
Read Firmware when finish
Project
Read Project when finish
Execute update firmware
SW67053 Serial Update
Ver. 1.100
INIT : Waiting...
FIRMWARE : Waiting...
PROJECT : Waiting...

Figure 5: "Update Device" windows

Note:
When you install a new version of the software it is better if the first time you do the update of the Firmware in the HD67053-B2-xxx or HD67053M-xxx devices.

Warning:
If the Fig. 6 appears when you try to do the Update before require assistance try these points:

- Check if the serial COM port selected is the correct one;
- Check if the USB or serial cable is connected between the PC and the device;
- Try to repeat the operations for the updating;
- If you are using a USB←→RS232 converter try with a native COM port or change the converter (only for HD67053M series);
- Try with another PC;
- Try to restart the PC;
- If you are using the program inside a Virtual Machine, try to use in the main Operating System;
- If you are using Windows Seven or Vista, make sure that you have the administrator privileges.

Figure 6: "Protection" window

In the case of HD67053-B2-xxx or HD67053M-xxx you have to use the software "SW67053": www.adfweb.com\download\filefold\SW67053.zip.

MECHANICAL DIMENSIONS:

Figure 8: Mechanical dimensions scheme for HD67053M-40, HD67053M-80

Figure 9: Mechanical dimensions scheme for HD67053M-160

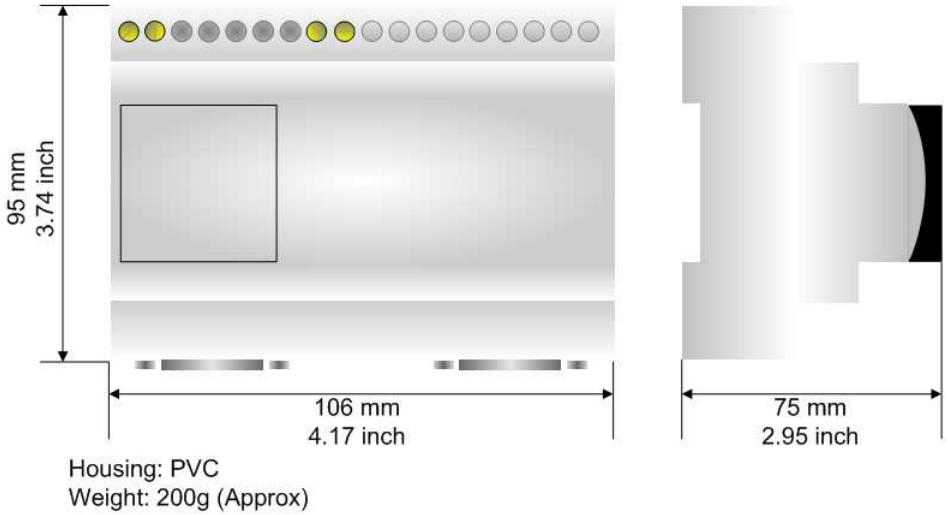


Figure 10: Mechanical dimensions scheme for HD67053M-250

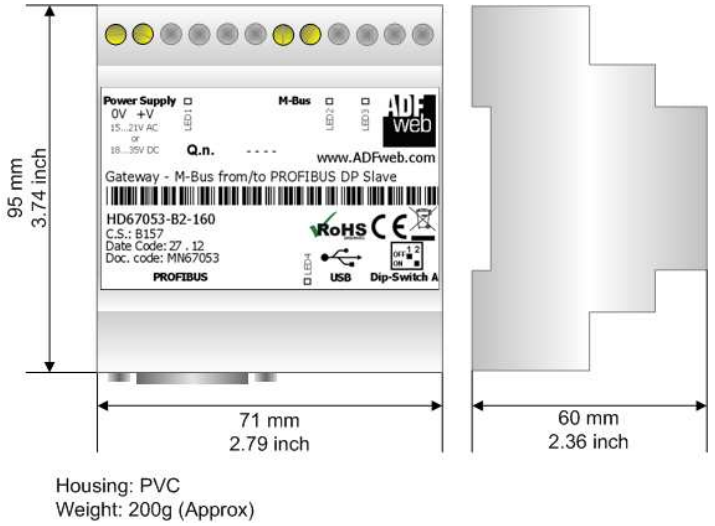


Figure 11: Mechanical dimensions scheme for HD67053-B2-xxx

ORDERING INFORMATIONS:

The ordering part number is formed by a valid combination of the following:

HD67053 – B 2 – xxx

Maximum number of slaves supported
40: up to 40 standard slaves (1.5mA consumption) connected to M-Bus
80: up to 80 standard slaves (1.5mA consumption) connected to M-Bus
160: up to 160 standard slaves (1.5mA consumption) connected to M-Bus
250: up to 250 standard slaves (1.5mA consumption) connected to M-Bus

Connectors Type
2: Fixed Screw Terminal

Enclosure Type
B: Modulbox 4M DIN Rail mounting

Device Family
HD67053: Gateway M-Bus Master from/to PROFIBUS DP Slave

Order Code:	**HD67053-B2-40**	**-**	Gateway M-Bus Master from/to PROFIBUS DP Slave (up to 40 slaves connected to M-Bus)
Order Code:	**HD67053-B2-80**	**-**	Gateway M-Bus Master from/to PROFIBUS DP Slave (up to 80 slaves connected to M-Bus)
Order Code:	**HD67053-B2-160**	**-**	Gateway M-Bus Master from/to PROFIBUS DP Slave (up to 160 slaves connected to M-Bus)
Order Code:	**HD67053-B2-250**	**-**	Gateway M-Bus Master from/to PROFIBUS DP Slave (up to 250 slaves connected to M-Bus)

ACCESSORIES:

Order Code:	**APW040**	-	Power Supply for M-Bus Master device that supports up to 40 Slaves
Order Code:	**APW080**	-	Power Supply for M-Bus Master device that supports up to 80 Slaves
Order Code:	**APW160**	-	Power Supply for M-Bus Master device that supports up to 160 Slaves
Order Code:	**APW250**	-	Power Supply for M-Bus Master device that supports up to 250 Slaves

WARRANTIES AND TECHNICAL SUPPORT:

For fast and easy technical support for your ADFweb.com SRL products, consult our internet support at www.adfweb.com.
Otherwise contact us at the address support@adfweb.com

RETURN POLICY:

If while using your product you have any problem and you wish to exchange or repair it, please do the following:

1) Obtain a Product Return Number (PRN) from our internet support at www.adfweb.com. Together with the request, you need to provide detailed information about the problem.
2) Send the product to the address provided with the PRN, having prepaid the shipping costs (shipment costs billed to us will not be accepted).

If the product is within the warranty of twelve months, it will be repaired or exchanged and returned within three weeks. If the product is no longer under warranty, you will receive a repair estimate.

PRODUCTS AND RELATED DOCUMENTS:

Part	Description	URL
HD67031	Analyzer/Scanner/Sniffer M-Bus	www.adfweb.com?Product=HD67031
HD67119	Converter USB 2.0 to RS485 Isolated	www.adfweb.com?product=HD67119
HD67120	Converter Ethernet to RS232/RS485	www.adfweb.com?product=HD67120
HD67507	Gateway Modbus TCP Server to RTU Master	www.adfweb.com?product=HD67507
HD67510	Gateway Modbus TCP Client to RTU Slave	www.adfweb.com?product=HD67510